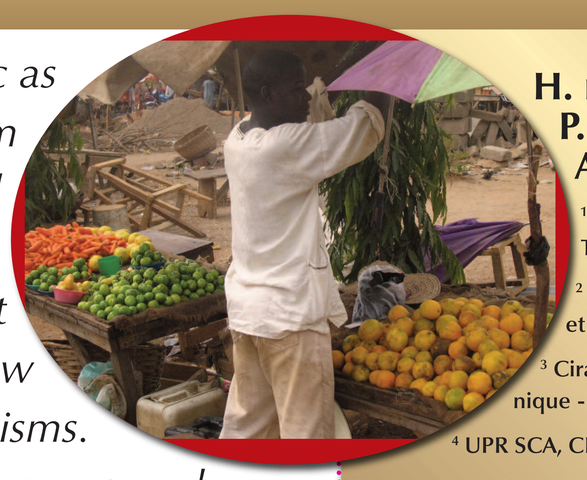
Emerging networks to foster the agroecology science in tropical horticulture

FRUIT and vegetables production is growing in Africa for domestic as well as export markets, but is faced to a major problem of pesticide misuse. To contribute to the reduction and better use of pesticides, CIRAD proposes solutions based on the agroecological approach. The underlying hypothesis is that increasing biodiversity in the agro-horticultural system will allow reduction of pesticide use by favoring ecological regulation mechanisms. To further investigate this promising pathway, CIRAD has set up research and higher education initiatives with its partners in the tropics.



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OMEGA 3

OMEGA 3 is a CIRAD institute-level core-funded project aiming at optimizing ecological processes for bio-aggressor regulation in agrosystems. It encompasses vegetable models in Sub-Saharan Africa, the Indian Ocean and Meso-America, along with other plant models (rice, cocoa and coffee). Promising results have been obtained on tomato bacterial wilt reduction in Martinique using various service plants in rotation with tomato, and on aerial pest (resp. fruit worms *Helicoverpa zea* and *H. armigera,* and Tephritid fruit flies) management on resp. tomato, okra and cucurbit crops in resp. Martinique, Niger and Reunion with resp. sweet corn, pigeon pea and GF-120®-sprayed maize as trap plants. http://omega3.cirad.fr/

Helicoverpa armigera on tomato fruit.

Experimental plots in Konni, Niger.

DIVECOSYS

DIVECOSYS has been launched in 2009 in Benin by West African institutions and CIRAD. This network gathers scientists and research professors from 7 countries (Benin, Burkina Faso, France, Mali, Niger, Senegal, and Togo). This network aims to develop research and higher education programs in Sub-Saharan Africa on pests management of cropping systems in savanna area through an agro-ecological approach. The crops include fruit trees and vegetables, but also crops interacting with them such as cotton, sorghum, rice... The models comprise monophagous and polyphagous insects at field and landscape levels: *Plutella xylostella* on cabbage with combined crops, fruit flies on fruit tree corps, and whiteflies that attack tomato and cotton with a high dispersal behavior.

Plutella xylostella.

Automated weather station in Thies, Senegal.

Cowpea during rainy season under mango tree in Senegal.

DEVAG

DEVAG is a regional project funded by European Commission, associating France with institutions from Cuba, Haiti and French West Indies. The general objective is to improve the agroecological horticultural systems in the tropical islands based on crops diversity to manage pests, diseases and weeds. Research also encompasses the following components: (i) substitution of chemical fertilizers with local organic resources, (ii) selection of cultivars adapted to low-input systems, (iii) crop-livestock integration. One model will include the ecology of fruit flies in the creole garden, characterized by high number of various crops and trees. http://devag.tropical-agroecology.org/

Creole garden in Haiti.

Pig in Creole garden in Haiti.

Traditional cabbage monocropping.

Mango cv. Boukhodiekhal in Senegal.

Perspectives

All these research projects are reinforced by ECOHORT a network on innovative horticultural systems based on ecological intensification. It brings together universities (Montpellier Sup'Agro, Agro-campus Ouest Angers, University of Dakar, University of Abomey-Calavi…) and research institutions from Senegal, Benin, Morocco and France to promote the system approach in designing ecologically intensified systems. All these combined efforts imply a strong evolution of the control of pests in the crops. The objective is not to merely find substitutes to chemical pesticides but to find other ways of producing fruit and vegetables for a better health and a safer environment.

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